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SECOND LISTERIAN ORATION

BY

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D.Sc., LL.D., F.R.S., etc.

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*Delivered in the Convocation Hall, University of
Toronto, June 18, 1927*



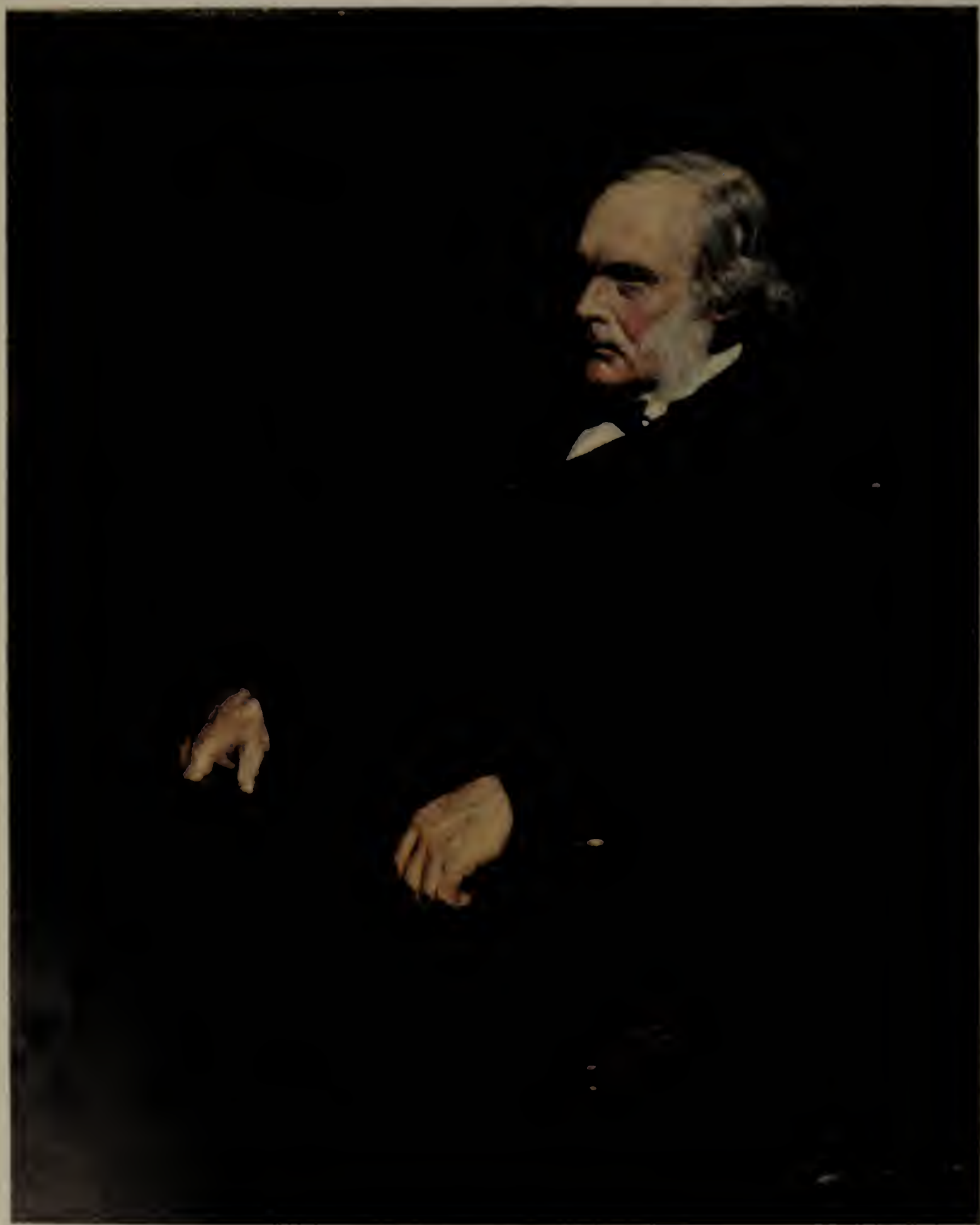
UNDER THE AUSPICES
OF THE
LISTER MEMORIAL CLUB
OF THE CANADIAN MEDICAL ASSOCIATION

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LISTER

After a portrait by Mr. J. H. Lorimer, R.S.A.
(1895)

FOREWORD

HE Executive Committee of the Lister Memorial Club has again the pleasure of presenting the members of the Canadian Medical Association with a special number of the *Journal* containing the triennial oration of the society as delivered at the annual meeting of the Association in Toronto, June, 1927, by Sir Charles Scott Sherrington, O.M., G.B.E., D.Sc., LL.D., F.R.S., etc., Waynflete Professor of Physiology in Oxford.

The Committee in making arrangements for the oration recognized the important place which physiology occupied in Lister's early studies. His enquiring mind was stimulated and attracted during his student days by the lectures of Professor Sharpey, the father of English physiology, and after graduation, while working in the surgical wards under Professor Syme in Edinburgh, he carried out important researches in several physiological problems which were engaging much attention at the time; the most notable, perhaps, of which was his successful investigation of the cause of the coagulation of the blood. It was, therefore, a source of great pleasure to the members of the Committee when Sir Charles Sherrington, as Professor of Physiology in Oxford, promised to deliver the second oration.

The address fulfilled all expectations. The greatness of Lister's character was clearly and pleasingly depicted and the story of his long, patient, but for many years futile, investigations into the causes inducing suppuration in wounds was told. Not, however, until he obtained from a friend papers describing Pasteur's discovery of the microbic cause of fermentation did he make progress. The speaker emphasized the keen but cautious investigating spirit with which Lister applied the knowledge he had thus obtained to the solution of the great problem which had hitherto baffled him. Many more years of investigation were necessary before complete success was attained. Gangrene and suppuration, the despair of the operating surgeon, ceased to occur under his new methods, and the awful pain and mortality attending operations of all kinds were checked. Following the general establishment of antiseptics, and later on of asepsis, and the employment of anæsthesia, surgery during

the past fifty years has been able widely to extend its field, and in great measure to accomplish its many beneficent aims.

It is with much pleasure also that in this special year of the Lister centennial—a centennial which has been so generally celebrated by the profession in all countries—we have the honour of publishing, in association with our own Listerian oration, the very interesting address of Mr. Archibald Young, B.Sc., M.B., F.R.F.P.S., Regius Professor of Surgery in the University of Glasgow, which was delivered at the opening of the Lister Centenary Exhibition in the Wellcome Historical Medical Museum in London on April 7, 1927. In it we are presented with a picture of the Glasgow Royal Infirmary with its disheartening mortality due to septicæmia, apparently unpreventable in the years before Lister assumed the chair of surgery in the university, and we are shown the wonderful change effected by his antiseptic methods. These years 1860-1869, during which he had charge of the wards of the Royal Infirmary in Glasgow, must be regarded as the most fruitful period of Lister's life, for it was during these years that he fully elaborated his antiseptic methods of treating wounds, and was able to present them confidently to the profession. Pasteur's work on fermentation had been before the public for a few years. Semmelweiss and Lemaire before Lister made use of disinfectants, but it was Lister alone who developed the antiseptic methods of surgery which have proved such an inestimable boon to suffering mankind. Lister remarked in one of his addresses regarding the process of inflammation as studied by him in the frog's web, "No one before me has, I believe, told the tale just as it ought to be told." A similar statement may be made regarding the development of the method of antisepsis in surgery.

In addition to Mr. Archibald Young's address we add from the pen of Dr. George Herbert Rae Gibson, D.S.O., Registrar of the Royal College of Physicians of Edinburgh, a brief account of the celebration of the Lister Centenary by the members of the British Medical Association at the annual meeting this year in Edinburgh.

We are indebted also to Dr. H. C. Jamieson of Edmonton, for the abstract from the Transactions of the International Medical Congress held in Philadelphia in 1876, the year of the Centennial Exhibition in that city. At that Congress Lister was present as a guest and was chosen to preside over the Section of Surgery. His brief address on taking the chair and the remarks by two Canadians which followed the reading

of a paper on "Antiseptic Surgery" will we are sure be read with much interest at the present day.

An account of the centennial celebrations of Lister's birthday, held in his honour in every medical centre throughout the Dominion, has already appeared in the May issue of our *Journal*, and the leading part taken by Professor John Stewart of Halifax, in initiating these celebrations has been duly acknowledged.

The Executive Committee, desires also, on behalf of the members of the Lister Memorial Club, to express thanks to the University of Edinburgh for permission to bring out, in this special issue, a reproduction of Lorimer's painting of Lister, and to the British Medical Association for the loan of the necessary blocks. Thanks are also due to the President of the Murray Printing Company for his generous offer to donate and supervise the printing of the plate.

A. D. BLACKADER.

LISTERIAN ORATION*

1927

By

SIR CHARLES SCOTT SHERRINGTON, O.M., G.B.E., M.D.,
D.Sc., LL.D., F.R.S., etc.

Waynflete Professor of Physiology, Oxford.

IN ancient times, in that old land of Greece, which taught so much that is perpetually beautiful because perpetually meet and right, custom was with the athletes met together at Olympia, to keep among their celebrations that of the heroes of past victories. In like spirit this Association proceeds to its celebration of the name of Lister. And by the kindness of this Association there is assigned to me on this occasion the honour of speaking of him before you. I bring to the task, however, no qualification like that of my predecessor, your inaugural orator of three years ago, a chosen pupil of Lister and his friend through many years, Dr. Stewart of Halifax. He happily could found the tradition of this celebration on personal memories of Lister, and he has thus preserved a number of them by placing them in the safe keeping of this Association as part of the written record of its Listerian Orations. To-night we stand a hundred years removed from Lister's birth. A hundred years now gives its vista to our retrospect, and must have its element of pathos for many who knew him. This year, on the actual centenary of his birthday, April 5th, the Worshipful Company of Merchant Taylors of the City of London, of which Lister was a Freeman, gathered at the hospitable table in their 14th century hall, not ten miles from the house where Lister was born, to do honour to his memory at which many guests were assembled from far and wide. On this occasion the sentiments of "Greater Britain" were voiced by Canada's representative, Mr. Irving Cameron.

Fifteen years ago, a few weeks subsequent to Lister's death, the then President of the Academy of Medicine of Toronto, Dr. N. A. Powell, at a session devoted to Lister and his work, dedicated that session in these words: "To the man whose memory we honour, it was given to confer greater benefits on humanity than have fallen to the lot of any one man else since time began." Spoken when the sense of loss was keenly fresh, that stupendous statement, viewed from the further vantage point of a hundred years since Lister's life began, is still as literally true.

* Delivered at the annual meeting of the Canadian Medical Association, Toronto, June 18, 1927.

I cannot attempt in the brief time before us, to recite formally the great story of his work; much of it is familiar to those assembled here. We may, however, examine together some steps in its accomplishment.

LISTER STUDIES THE PROCESSES OF INFLAMMATION IN THE FROG'S WEB

Let us picture first a young man seated at his microscope on a September evening seventy-two years ago when, as he wrote home next day, he proceeded as he had long planned, to watch in the web of the frog's foot the transition from health to inflammation following a transient point of injury. The young man is in Edinburgh; English, but teaching and learning in Scotland. The frog is Scottish throughout, as it came from Duddingstone Loch, which one can see from the Queen's Drive. There have been frogs famous in history. Thus, the frog which revealed to Malpighi and his microscope in Bologna the tiny tubelets for the blood which Harvey, discovering the circulation of blood, had guessed at but was powerless to see. Malpighi wrote on that day to Borelli, *magnum certum opus oculis video*, for that frog enabled him to complete Harvey's discovery, the foundation of modern medicine. Then there was the frog whose muscle happening to hang by a copper hook to the iron rail round the house top at Bologna, twitched as the breeze swung it, now 142 years ago, and by doing so fired Galvani's and Mrs. Galvani's curiosity and so Volta's; whence the electric power-plant at Niagara to-day, and the lighting of this hall by electricity to-night.

Lister's frog, on which he began his first-hand experimental study of inflammation, is truly not less memorable. Not that Lister's frog revealed any dramatic discovery to him forthwith, although he rapidly learned from it many things which were new. The hand of Providence shapes the course of discovery in sundry ways. Lister tells that he had recourse to these observations because he felt that some stages of the process of inflammation had not been traced as they might be. We see in it, however, more than those words express. We see genius directing itself, not toward this or that particular point of skill or difficulty in a highly technical art, but setting itself down to face a fundamental and all-pervading process as the central problem and master-key to surgery as a whole. Thus, watching inflammation daily on the one hand under the microscope in his laboratory, and on the other in the hospital of that pre-Listerian era, Lister's penetrative spirit came to perceive that this elemental, all-important process of inflammation, lying at the root of surgery as it did and does, bore a twofold import and was even as Janus was, double-faced. One of its faces, smiling and beneficent, said, and said truly, "I am the means by which Nature in her wisdom deals with, and repairs, and heals an injury and a wound; I am the Angel of Healing on whom the surgeon can rely; I say to him, be of good cheer." But its other face, scowling and malignant, said,

"I exhaust with fever; I destroy tissue and life; I am the surgeon's evil fate; all his care and skill I bring to nought; I bid him despair."

The problem which thus shaped itself to Lister, pursuing with patient enthusiasm his impassioned study, was in a word the control of inflammation. Might it not be possible, he asked himself, to glean by careful observation and experiment such knowledge as might enable the surgeon to suppress the harm and retain the good; to cultivate inflammation, the healer, and to banish suppurative inflammation, septicæmic inflammation, and gangrenous inflammation, the destroyers. The task must at that time have appeared to most men insuperable, the hope fantastic. But Lister had courage to hope. The comment of older and experienced onlookers and colleagues would be in effect: "Yes, inflammation is both beneficial and harmful, both healer and destroyer; but inflammation and suppuration are one great natural process; how in that process sunder its good from its evil? Man can not part what Nature has conjoined. Humanity must bow before its inexorable fate of admixed good and evil."

Now Lister loved surgery; had a proud faith in surgery; no one could have felt more acutely than did he, living in those years, the bitter fact that as hospitals grew, the blight upon them from uncontrolled and malignant inflammation seemed to grow disproportionately with them. A surgeon adverting on those times has written: "Some hospitals on the continent of Europe were entirely closed, because hospital gangrene, blood-poisoning and death followed every operative intervention."

LISTER'S OPPORTUNITIES AND EQUIPMENT

What equipment had the young Lister for solving this dire problem, insoluble as it seemed? Bacteriology, he had not, for it was uncreated as yet, being a future child largely of his own work to come. Laboratory also he had not; for in the sense in which we today understand it there was no laboratory at that date attached to any surgical clinique. No, Lister's equipment for the problem consisted in a ceaseless contact with surgical cases for which his eye never staled, and an impassioned interest in surgery which never flagged. He had too his trusty microscope; and he had first-hand knowledge of the current physiology, and of some of the chemistry of his day. Such work as this he was wont to turn to constantly in that one room, back-parlour, workshop, sanctum, which ever we choose to call it, which he set apart, whatever house he dwelt in. Over and above anything with which technical training could equip him, Lister had his character in its bearing toward Nature and toward men. As an observer he had patient enthusiasm, modesty and intensity, self-restraint in inference, scrupulous probity of statement, and that undauntable scientific courage whose one fear is lest it should lose the truth. These were reinforced by a profound compassion for, and passionate sympathy with suffering, so that every fibre of him strained to work for its relief. That painstaking scientific nature of his, satisfied

with nothing unless tested by himself, harboured an optimistic scepticism, which declined to rest satisfied with the view that suppurative inflammation was inalienable from surgery. The account, which one of his early physiological papers gives of the pigment cells of the frog's skin watched through the microscope, remains a piece of masterly scientific description. From the detailed study of these pigment cells in his early years, Lister drew some of that vivid insight into cell-life struggling against irritant, agents which informed and directed his triumphant surgical strategy later on.

There was genius in his decision for a frontal attack on the universal and seemingly impregnable position of suppurative inflammation; the humility of genius, to set itself to begin at the very beginning; the daring of genius, to set itself to rebuild from the foundation. So also now, in his incorrigible optimism and persistence, surely we again see the inspiration of genius, to hope against all hope.

And so our glimpse of him and his task in 1855 must leave him to its prosecution, on the one hand in the surgical clinics; on the other in his lodging with his microscope and the web of the frog's foot. We recognize in him a man who is at once very modest and very determined, and we know that history has privily inscribed him on her scroll as the man destined to make surgery safe for the world.

TEN YEARS LATER—PASTEUR'S RESEARCHES

Our picture shifts to a decade later. In those ten years what progress has he made toward his great aim? To outward seeming, that is as regards a routine method, he has been travelling along the beaten track much the same lines as other surgeons of the time, but his spirit of enquiry, and his reflections on the great subject of his study, have brought to him certain conclusions. One is, in his own words, that "the essential cause of suppuration in wounds is decomposition brought about by the influence of the atmosphere upon blood or serum retained within them and, in the case of contused wounds, upon portions of tissue destroyed by the violence of the injury."

The influence of the atmosphere? Can then the gases that we breathe engender mischief in and thus poison wounds? No, said Lister. Air entering the pleura through a small tear in the lung does not of itself cause inflammation. Lister felt certain that the cause of suppuration could not be just the air itself. Yet the air brought it. What mysterious and evil endowment of air could it be?

FIRST ACQUAINTANCE WITH PASTEUR'S INVESTIGATIONS

Absorbed concentration on one problem was part and parcel of Lister's character. All that by seeing, hearing, or reading he came across in his strenuous, but constantly reflective day, could not but influence his thoughts on the problem which engrossed his thought. In this year

1865, to which we have now followed him, ten years since he sat down to study that frog in Edinburgh, his colleague at Glasgow, Thomas Anderson, the Professor of Chemistry, showed him some recent papers of a French chemist, by name Pasteur; papers dealing with the causes of fermentation and putrefaction which up till then had been thought to be due to spontaneous chemical decomposition. Putrefaction—why that was the very thing that he, Lister, told his students was the cause of suppuration. He must see what this chemist Pasteur had to say of putrefaction—perhaps nothing valuable; the subject had been always very obscure and complex. Nevertheless, he ought to read what this chemist had to say. And so, Lister the surgeon, open-minded and cautious, read the French chemist's papers and found the announcement that putrefaction was caused, not by air as such, but by reason of very minute living beings, germs, carried by the air, and settling in these fluids. This chemist even asserted that animal fluids have no natural tendency to putrefy, but ferment and putrefy only under the action of germs which the air may bring. Could this be true? The renowned chemist, Liebig, so Lister learned, refuted this view and had brushed it aside, oracularly and even scornfully. Nevertheless, the evidence of this young chemist, Pasteur, was given clearly and seemed well-grounded. Lister's open but cautious mind felt he must give this supposition a trial. Once more in Lister's make-up we meet genius. Chance, if we call it so, had put into his hands the account of a discovery made in another land, and in a different branch of science from his own; a discovery by a worker unknown to Lister, and indeed, unknown to medical circles generally even in his own country; a discovery discredited by Liebig the acclaimed leader of the medical chemistry of the time. Lister however was, open-minded, and his genius, the genius inspiring his own observations and reflections of the past ten years, had prepared him. In the field of observation and natural discovery, chance favours only him who is prepared. Putrefaction, air, and yet not the mere gases of the air; he himself had come to recognize that as the probable truth in regard to suppuration and sepsis. The more he studied Pasteur's experiments the less they seemed open to criticism, and the more he felt that wound suppuration and sepsis might indeed be due to contamination, and the growth in the wound of minute microscopical living beings carried by the air.

PERSONAL INVESTIGATION OF RELATION OF MICRO-ORGANISMS TO SUPPURATION

Lister's nature was not to draw an inference and leave it at that, a mere likelihood, a probability unproven, although also undisproven. Without delay in this year 1865 he set to work to test by clinical observation and laboratory experiment this new view and possibility. He applied wound-dressings excluding germs from, and calculated to destroy

germs which might be already in wounds he treated. Conviction grew in him as he proceeded. Then rose the great generalization to his mind, that the French chemist Pasteur in his brewery, and himself in the surgical ward were both envisaging and engaged upon separate aspects of one and the same fundamental problem; fermentation, putrefaction, wound infection and sepsis were all one. It is, perhaps, difficult for us now, in the light of all that has since become common scientific knowledge, to appreciate fully the intellectual flight exhibited by Lister in this generalization. It was a step of genius, if ever genius was. Lister's modesty and his unassuming, though ever dignified, address has perhaps stood in the way of a general attribution to him of genius. There clung to him throughout life something of that simplicity of manner and of phrase, which had been part of his upbringing in that wonderful and beloved home circle of his Quaker parents. Characteristic of Lister all his life was a sobriety of expression, which made yet the more impressive his self-restrained statements of the great results achieved as his new surgery developed. No man in his career had more excuse for, more justification for, hyperbole than had Lister, and no man ever indulged less in hyperbole than did he. Lister's rapid perception of the relation of Pasteur's fermentation work to the great problem of suppurative inflammation, which was confronting surgery, was genius. Such a relation to Pasteur's work was not foreseen by Pasteur himself, or by any of those working with Pasteur. It took Lister long to bring it home to, or even to make it understood by, many of the ablest surgeons of the time, in spite of the impressive testimony of the facts. Lister, alone of men, perceived because his mind was prepared by his own researches, and because like Pasteur he had genius.

LISTER'S APPRECIATION OF THE TRUTH

The problem, as Lister seized it may be stated thus: wound infection with all its attendant horrors and disasters was due to, and traced to, living particles entering from without and propagating on the wound surfaces, and in the wound discharges. The horrible and deadly chain of catastrophes, which had come to be regarded as practically unavoidable, could, therefore, henceforth be fought on a rational basis. Lister accordingly sought for some chemical agent, some "antiseptic" which would kill the germs. The problem, however, was not simple. A chemical agent which could kill germs was prone also, when applied to a wound, to harm the living cells of the wound on which repair depends. Moreover, the antiseptic which could kill the germs was liable to lose much of its power when applied to a wound which was freely discharging; the wound discharges reduced or even abolished the active power of the antiseptic; and the antiseptic itself, if applied in strong solution, caused harmful corrosion of the wound surface. Therefore another step in his campaign was to obtain asepsis by an antiseptic, not only to des-

troy germs which had already got into the wound, but to prevent microbes from entering the wound. This killing of germs in or upon dead material, sponges, ligatures, instruments and the like presented no such difficulty as that inherent in the methods for destroying germs actually within the wound. For wounds, therefore, which were to be deliberately inflicted, as by the surgeon in planned operations, Lister's resource was to destroy the microbes beforehand on everything which would come in contact with the wound; in short to preclude germs altogether from access to the wound. Under this plan he soon found that wounds healed regularly without suppuration, by "first intention;" infection practically disappeared, hospital gangrene, blood-poisoning, erysipelas and tetanus vanished from his wards. The cavities of the body, the abdomen, the chest, the great joints, which before were holy of holies which even the greatest surgeons, the high priests of surgery, did not dare to enter, could now be laid open with impunity by any faithful follower of Lister, and the diseases which affected them be made subject to their skill.

INFLUENCE OF ASEPSIS ON SURGICAL PRACTICE

In October 1867 he wrote to his father: "I now perform an operation with a totally different feeling from what I used to have; in fact, surgery is becoming a different thing altogether." Such simple words from him announced the ever-memorable conquest of surgery, the founding of a system of wound-treatment, which has relieved mankind from most of the danger and suffering attendant on wounds and surgical operations, and has permitted the art of surgery to advance to unimagined achievements. Diseases from which there was no release save by death could now be eradicated and life and health restored to the sufferer.

After convincing himself and his own immediate students, however, he had still to convince the world. That he had difficulty in so doing, we all know. It is difficult to get a hearing from busy men for even a great new truth. Some misunderstood even when they did hear. Some were experience-hardened, and not open to hear. Some were wedded to old ways, and hardly wanted to hear. Lister worked unceasingly at his task; his noble character was quite undismayed; he disliked controversy, and he taught his new principles by practical example in the wards even more than by precept in public addresses. He was wont to say that the first to practise his principles, outside of Great Britain, was Professor Saxtorph in Denmark. An anecdote is told by Saxtorph showing a difficulty of the reform. Saxtorph's clinic in Copenhagen was in those days served by nurses of the old school, worthy women, but unversed in the principles of antiseptis and asepsis. To save the time of the visiting surgeon their zeal took pride in having the patients' dressings all ready and opened for inspection. What was Saxtorph's dismay on his visit one day to see an amputation stump he had so care-

fully dressed all stripped of its antiseptic protections and bared to the surroundings of the ward. He exclaimed to the zealous nurse whose deed it was: "Is this imbecility or wickedness?" The good woman answered contritely, "Oh, please believe me, it is imbecility."

GRADUAL RECOGNITION OF THE IMPORTANCE OF ASEPSIS

Considering all things, the progress made by Lister's teaching was not slow. To effect so great a revolution in the theory and practice of a skilled professional art based on long tradition, twenty years is a brief period. Not many great practical reformers have at the age of sixty been able to look round and see the world convinced and eagerly adopting what at the age of forty they had first begun to introduce. Yet that was Lister's happy case. Public veneration and gratitude began to attach to his very name. He wore his years well. As we all know, the summer after his 70th birthday found him here in Canada, for the Toronto Meeting of the British Medical Association, active, alert, and despite his years youthful, especially in his keenness on new work and ideas. He often recalled this Canadian visit with especial delight. In 1898, he was made President of the Royal Society. In his valedictory Presidential Address to the Royal Society six years later he recounted with vivid animation a scientific incident which during his Toronto stay had profoundly impressed him: a demonstration by Dr. W. G. MacCallum, now Professor W. G. MacCallum of Johns Hopkins University. His words were: "The wonderful discovery by Dr. MacCallum, which, but for the beautiful demonstration of it I saw at Toronto, would have seemed almost incredible." It was a discovery of fundamental importance for the investigation of the then newly-revealed malaria parasite.

RE-EQUIPMENT OF SURGERY

Lister's late and declining years have as their background the glow, as it were, of the affectionate reverence of an innumerable host. The man in the street knew in a sort of way that Lister had banished fever and pain from the after-history of surgical operations; those with more detailed knowledge can trace to his research besides these special and transcendent benefactions to humanity, others no less benign.

By re-equipping surgery for fresh conquest and ampler scope, he gave to experimental medicine and physiology a new means and power for discovery. Surgery is a great weapon for research. The experiments discovering the localization of function in the brain could not have been carried out except by technique on the lines of Lister's then newly-discovered principles of surgery. Pavloff could not have made his discoveries revising our knowledge of the digestive organs without pursuing Lister's principles. Hardly five years ago the civilized world received from Toronto with grateful acclamation the beneficent discovery of insulin, which has since brought relief and rescue from death to thousands. I

am confident the distinguished and chivalrous investigators, alumni of this University, whose brilliant work achieved that immortal advance would be the first to tell you that in part, the means and the technique for the achievement was laid by Lister years ago, though he himself could never have foreseen the pillar of victory over disease and death which they were to erect with its shining light sending rays of hope and relief and comfort to diabetic sufferers the world over.

It is sometimes remarked with regret that Lister's writings seem to-day but little read, but the significance of Lister's work lay no more in the written page, than did that of Jenner or Pasteur. It lives, and its commemoration lives in daily recognition of it by the surgeon, and indeed by civilized communities over the whole planet. Thus it is that through years to come, although Lister's actual papers may become matter chiefly for the historian and the antiquarian, Lister will receive his unfailing meed of commemoration in the manner, which of all ritual and offering, would have been the most congenial to him, namely, the daily observance of the methods which he discovered and taught for the alleviation and prevention of disease. That is praise of a kind, which, testifying as it does, to the triumphant truth of his theory and practice, also establishes for it something which can be said, but rarely, of achievements of applied science however great. For year after year affirms and confirms that the step taken by Lister will never be retraced or withdrawn from as mistaken. Lister chose for his life's task the most urgent problem in all surgery and set out to work a theoretical, and founded on that, a practical solution, which was in principle complete and which nothing in principle can complete further. His work perpetuates him in the memory and gratitude of mankind, humanly speaking, for ever.

The Council of his own College of Surgeons solemnly declared of him at his death: "He raised surgery from a dangerous and precarious practice to a precise, safe and beneficent art." Those words by their very omission of all reference to time, bespeak truly the permanence of his achievement. Lister put a new and unimagined power into the hands of man for healing, for remedying injuries, for subduing pain, and for keeping death itself at bay. The astounding thing has been said of him, and can be said of him with every likelihood of truth, that though he inaugurated his work not seventy years ago, he has already been the means of saving more lives, than all the wars of the past 1,000 years have destroyed. A high authority has said that he has been the means of relieving more pain than all the drugs that are known. Lister it is who more than any other has made surgery what it is to-day, a far-flighted Angel of Mercy the civilized world over. It is with these things in mind and at heart to-night that our gratitude brings its offering of admiration and veneration to the memory of one great in character as in achievement, and great even among the greatest of the benefactors of mankind, Joseph Lister.

LISTER

AN ADDRESS DELIVERED ON THE OCCASION OF THE RECEPTION GIVEN
AT THE OPENING OF THE LISTER CENTENARY EXHIBITION
AT THE WELLCOME HISTORICAL MEDICAL MUSEUM,
LONDON. APRIL 7, 1927.

By

PROFESSOR ARCHIBALD YOUNG, B.Sc., M.B., C.M.,
F.R.F.P.S.G., F.A.C.S.

Regius Chair of Surgery, University of Glasgow.

IT is both an honour and a privilege to be permitted to take part in this historic function, by which we mark the Centenary of the birth of our great Master—Lister. Honour and privilege have fallen to me partly because of the accidental circumstance which associates me with the Regius Chair of Surgery in the University of Glasgow, which, from 1860 to 1869, was occupied by him whose birth we celebrate to-day; and partly by reason of the absence of Sir Hector Clare Cameron, whose deputy in effect I am. Sir Hector, to his profound regret, and to our sincere sorrow, felt himself unable to face, at his advanced age, the considerable strain of the journey to London.

The honour and the privilege which are mine to-night imply a particular obligation. The obligation is to the alumni and students of the University of Glasgow, in whose name I venture to submit my modest but sincere tribute of respect, of admiration, and of veneration. Beaconsfield has somewhere said "One of the greatest legacies of any nation is the memory of a great name, and the inheritance of a great example."¹ This is equally true when applied to a community, or to a school or seat of learning. The University of Glasgow has a long and glorious record, and its professorial roll includes the names of many famous sons; of many who have done notable work for the advancement of knowledge, and for the benefit of the human race. The traditions of well-nigh four hundred years cluster around the names of men who, in their day and generation, have done much to advance the efficiency and the repute of their Alma Mater. In the long and distinguished roll no name outshines that of Lister. What I have called elsewhere "The Lister Tradition"² renders illustrious for all time the Regius Chair of Surgery which he so gloriously and so fruitfully adorned. In the "Great Procession

of the Immortals" (spoken of by Sir Berkeley Moynihan in his John B. Murphy Oration),³ who, through the centuries, have promoted the well-being of humanity by their labours for the advancement of the science and the art of surgery, none will have a more prominent place.

As Antony said of Brutus "This was the noblest Roman of them all His life was gentle; and the elements so mixed in him that Nature might stand up and say to all the world 'This was a man!' "⁴ Surely of the great Master we may truly say "This was a man."

THE DEVELOPMENT OF THE ANTISEPTIC SYSTEM

The story of the birth of the antiseptic system has been often told. During the last few days it has been told again, and from many and varied points of view. Through the ages it will continue to be told. What it has meant to humanity, in the relief of suffering, in the saving of life and limb, and in the bringing of a brighter hope in the battle with disease, most of us to-day are able to visualize only by the exercise of imagination. Few are alive to-day who know anything, save from hearsay, or from reading, of the terrible conditions which prevailed in the pre-Listerian days. Fortunately, many and authentic accounts are available, and the story of the dark days of surgery is there for all to read.

The history of the epoch-making investigations of Lister, and of his cautious application of the results of these investigations to the practical technique of surgical treatment, and of the unerring deduction with which he followed up the brilliant observations of his co-worker and friend, Pasteur, is generally known, and his position is generally acknowledged. It is true that others before him had had some inklings of the truth; like Semmelweis, who, in 1847, traced puerperal fever to infection, and did much to indicate how it might be prevented, incurring much opposition and even obloquy thereby from those whose practice was to benefit most by his teaching; or, like L  maire, who, in 1863, in a treatise on carbolic acid, advocated its use for the destruction of germs in wounds; or, like Bottini, who, in 1866, urged that carbolic acid should be employed in the treatment of suppurating wounds, because he thought that certain germs were the active agents of suppuration. But it is none the less true that it was the master mind of Lister that finally solved the riddle of wound infection and its prevention; the apparently insoluble riddle, which had baffled for so long the most expert and enlightened surgeons up to his time. Lister was able to work out fully the whole problem; to show, beyond question, how infection should and could be excluded from a wound; how it should be counteracted did it gain entrance; and how Nature could be entrusted with repair, if noxious germs could be excluded from the tissues, or could be counteracted by suitable antiseptic agents. More than any man, Lister helped to free surgery and surgical development from the age-long bonds that shackled opportunity, and that limited progress in almost every direction.

The story, I have said, has often been told, both of the brilliant researches and of their practical applications. I have no intention of re-telling the oft-told tale. Is it not told in the very best of all ways in this great historical exhibition, collected and dedicated to the memory of the Master? The promoters of this Lister Museum have constructed here, in miniature, a picture of the great life work of the Master; a picture which, with judicious selection, yet with sufficient generosity of emphasis, portrays the successive steps by which was built up the complete doctrine of antiseptic surgery. Of it may truly be said, not merely that "every picture tells a story," but that "the whole picture tells the story." If then I do not propose to attempt to tell again the story of the birth of antiseptic surgery—which, expressed otherwise, meant the re-birth of surgery—I would like, nevertheless, to dwell for a moment on a few facts and figures bearing on surgical conditions in the times shortly preceding that re-birth.

STATISTICS OF PRE-LISTERIAN SURGERY

*From the 33rd. Annual Report of the Glasgow Royal Infirmary*⁵—that is, the Report for the year 1827, exactly a hundred years ago—I cull the following:—"The number of surgical cases was 795 average rate of death 14 1-6th. (males) and 14 1-5th. (females). The operations performed amounted to 80, of which about one half may be reckoned capital, "or important." Note that the total death rate of the surgical cases was 7.08 per cent. The death rate, however, of the 80 cases operated on was 11, or 13.7 per cent. If, however, we accept the statement that only half of the 80 operations should be reckoned as capital, or important, the death rate is 11 out of 40; giving a percentage death rate of 27.5, or a little more than one death in every four cases operated upon.

Let us examine these figures a little further. Out of the eighty operations, or the forty capital operations, major cases, as we should now call them, twenty were amputations of thigh, of leg, of arm, or forearm, and at the shoulder. Of these twenty amputations, five died a mortality rate of twenty-five per cent. Two of the thigh amputations died of gangrene. Two of the leg amputations died; one from suppuration in the thigh, and the other with abscesses in the lungs. The cause of death in one of the arm cases is stated to have been sloughing of the stump.

Let us pass to the *35th Annual Report of the Glasgow Royal Infirmary*⁶—that is, the Report for the year 1829. I quote the following:—"The table of operations gives the results of each. They amount to eighty-one, and the deaths to eleven. Of the primary amputations, one died; of four secondary ones, three died; in all of whom purulent deposits were found in the lungs, and sero-purulent effusion into the cavity of the chest."

The question may here be asked. Why go quite so far back? What

about the times more closely related to the coming of Lister, and to the period of the re-birth of surgery? Very well. Let us take the year 1853, that is, twenty-four years later than the period referred to in the previous extract, and seven years before Lister's appointment to the Regius Chair in Glasgow.

From the *Quarterly Report of the State of Disease in the Glasgow Royal Infirmary*⁷—for the third quarter of the year 1853—I quote the following:—"The excessive mortality attendant on secondary amputations from injury is a result that should be well weighed by the surgeon in his attempts to save life and limb, for there are few points in practice better established than the great dangers accompanying delay in operation. By an analysis of 284 amputations performed in the Glasgow Royal Infirmary during a recent decennium we have been able to trace the following results, corroborating the experience of similar institutions." Here follows a very striking table, showing the results for the ten years' period referred to.

<i>Nature of Amputation</i>	<i>Total</i>	<i>Forearm</i>		<i>Arm</i>		<i>Leg</i>		<i>Thigh</i>		<i>Mortality per cent.</i>
	<i>Cured or Died</i>	<i>C.</i>	<i>D.</i>	<i>C.</i>	<i>D.</i>	<i>C.</i>	<i>D.</i>	<i>C.</i>	<i>D.</i>	
Primary	169	31	4	34	15	31	22	11	21	36.6
Secondary, from injury	56	3	—	7	9	6	13	3	15	66
Secondary, from disease	59	3	2	4	5	14	9	15	7	38.9
Total	284	37	6	45	29	51	44	29	43	42.95

The results shown in this table may be expressed otherwise:—

Amputations of forearm	6 deaths, of 43 cases.....	1 in 7
Amputations of arm	29 deaths, of 74 cases.....	2 in 5
Amputations of leg	44 deaths, of 95 cases.....	1 in 2.1
Amputations of thigh	43 deaths, of 72 cases.....	1 in 1.6

In other words, the *chances of recovery* were

6 to 1	in amputations of the forearm
3 to 2	in amputations of the arm
1 to 1	in amputations of the leg
.6 to 1	in amputations of the thigh (roughly 1 to 2)

Or, reversing these figures, the *chances of death* were:

For the forearm	1 to 6
For the arm	2 to 3
For the leg	equal
For the thigh	2 to 1 (roughly)

These are surely appalling and disheartening figures, which, as Sir Clifford Allbutt said, might well make "patients, no matter how critical their need, dread the very name of hospital, and the most skilful surgeons distrust their own craft."

PRE-LISTERIAN SCOURGES

Erysipelas, suppuration, pyæmia, hospital gangrene, these were the scourges that rendered the skill and the dexterity of the pre-Listerian

surgeons so often futile, and that so greatly depressed Lister himself. The new hope that he saw foreshadowed in the discoveries of Pasteur became, ere long, a settled conviction in his mind, and he set himself to apply the results of these discoveries, which his own investigations proved to be true, to the banishment from the hospital wards of these grim spectres of disease and death. Those of us who have not known the terror of these pre-Listerian days cannot properly realise how depressing, how disheartening, it must have been to the expert surgeon of those days to see case after case succumb to one or other of these mortal diseases. To-day, as complications of ordinary wounds, we know them not; even as occasional happenings, in cases grossly infected quite independently of surgical procedures, they are rare events. Hospital gangrene, in any of its forms, I suppose no surgeon of this generation has ever seen. But what a scourge it used to be! It was the bane of surgeons and of hospital managers alike.

PRE-LISTERIAN ATTEMPTS TO CHECK HOSPITAL GANGRENE

Turn again to the *Quarterly Report of the State of Disease in the Glasgow Royal Infirmary*⁸—for the first quarter of the year 1853—and read the following:—"We regret to learn, notwithstanding, that hospital gangrene has reappeared in several of the wards, and has been productive of much mischief. It scarcely admits of doubt, that this plague spot has arisen from the accumulation in any one department of too large a number of open sores; and its frequent recurrence furnishes another strong proof of the necessity which exists for additional surgical accommodation."

That the problem seriously exercised the minds of the Managers of the Royal Infirmary is seen by perusal of the next *Quarterly Report*⁹, where there is the following further reference:—"In our last report we had occasion to allude to the presence of hospital gangrene in some of the surgical wards, and to notice its pernicious effects on the recoveries of the patients. We are now luckily in a position to be able to record the entire cessation of the epidemic, not, however, without producing one fatal result." The *Report* goes on to describe the steps taken by the Managers to deal with the said epidemic, and the opinion is expressed that these steps, namely, segregation of the infected, and after-fumigation of the wards "are the only feasible measures that can be adopted with any degree of success in attempting to uproot the evil *for a season*." (the italics are mine, A.Y.) There was evidently no great hope in the minds of the Managers that the dread malady would not soon recur; and, doubtless, sad experience fully justified their lack of confidence. But the Managers go on to say, in the *Report*:—"On the other hand, for the purposes of prevention, we know no plan more effective than that of keeping the wards well aired, by having the windows constantly drawn, and retaining seasonable fires both in winter and summer. The advan-

tages attending this very free system of ventilation will be partially counteracted by the inflammatory complications which occasionally ensue from its adoption, but the occurrence of a few pleuritic stitches, readily succumbing to treatment, can never be put in comparison with the dire effects so liable to ensue from a single case of hospital gangrene." Yet in the *Report*¹⁰—for the fourth quarter of the same year—we find once again the admission that "appearances of hospital gangrene have occurred, but were speedily checked."

This view of the Managers of the Royal Infirmary that by improved ventilation and such means the dire hospital diseases, which we now know to be due to infection by pyogenic germs, could be effectively banished, was not easily eradicated. Indeed, it outlasted even the period of Lister's connection with the Infirmary, for we find it alluded to in a somewhat wrathful letter of the Secretary to the Infirmary, published, in both lay and medical Press, almost twenty years after the date of the last quoted *Quarterly Report*. The circumstances were these. When Lister left Glasgow for Edinburgh, on his appointment to the Edinburgh Chair, Lister published a paper dealing with *The Effects of the Antiseptic System of Treatment upon the Salubrity of a Surgical Hospital*.¹¹ In this paper he declared, that the adoption of antiseptic treatment had transformed the wards which had been under his care in the Glasgow Royal Infirmary from among the most unhealthy in the country into "models of healthiness." Voicing the opinions of the Managers of the Infirmary, the irate secretary proclaimed that the improved healthiness of the wards "as marked in the medical as in the surgical department," was to be ascribed mainly to "better ventilation, improved dietary, and the excellent nursing to which the Directors have given so much attention of late years".

SUCCESS ATTENDS EMPLOYMENT OF ANTISEPSIS

Lister had been able, indeed, to state in a paper delivered before the British Medical Association in Dublin, in 1867,¹² that: "during the previous nine months, in which the antiseptic system has been fairly in operation in my wards, not a single case of pyæmia, erysipelas, or hospital gangrene has occurred in them." Yet the truth took long to sink into the minds of his contemporaries, for, even ten years later we find the writer of a paper, read before the Royal Medical Society of Edinburgh, quoting from the Hospital Report the fact that though Lister had had only two cases of pyæmia in the previous eight years, in another service in the same hospital, there had been, within five years, no less than forty-three cases of that fell disease.

But why elaborate the story further? Why dwell at greater length on the desperate efforts of the ignorant, or the prejudiced, to prevent or to lessen the dread diseases of infection? Not all the opening of ward windows, not all the segregation of the infected, not all the fumigation

of the wards, could effectually safeguard any surgical patient from the risk of catastrophe. It remained to Lister to close the door through which the infective agents had been accustomed to enter the chamber consecrated to the active processes of repair.

There was admitted to the Glasgow Royal Infirmary, on the 12th. of August, 1865, a boy of eleven years, by name James Greenlees. He had sustained a compound fracture of the left leg. Lister put to the test the principles of his new system. In other words, he treated the case antiseptically, and with complete success. Dr. John Stewart, of Halifax, suggests, and not without good reason, that this date is well worthy of being marked specially in "the Surgeon's Calendar."¹³ As Dr. Stewart says,—“The Renaissance of Surgery had begun”. And what a Renaissance it was! What a Re-Birth! Less than two decades before, the discoveries of Humphrey Davy, Horace Wells, Morton, and Simpson, regarding the practicability as general anæsthetic agents of nitrous oxide gas, ether, and chloroform, had opened up a wide gateway to surgical advance, but that advance was effectually barred by the dragon of pyogenic infection. Lister's great achievement broke down the barrier, and the flood tide of advancing surgical triumph swept uninterruptedly on. The results of the great onward sweep are written in the abounding surgical literature of the last fifty years—what Ballance has termed “the most glorious period of British Surgery”.

The contrast between pre-Listerian conditions and results and those of recent days may be illustrated by a few further figures. I have alluded already to the striking figures of that disastrous decennium, prior to 1853, in which, in the Glasgow Royal Infirmary, out of 284 major amputations—forearm, arm, leg, thigh—122 died,—a mortality rate of 42.95 per cent. Let me pass right away to our own times, and give you the corresponding figures for the same Infirmary, half a century later—i.e. for the ten years' period ending with 1925.

The mortality rate of amputations of forearm, arm, leg, and thigh in the Glasgow Royal Infirmary, decennium 1916–1925 was as follows:—

Upper limb 122 amputations with 12 deaths..... 9.8 per cent.

Lower limb 467 amputations with 111 deaths..... 23.7 per cent.

Or, combining the figures for upper and lower limbs:—

There was a total of 589 amputations with 123 deaths; 20.8 per cent.

For comparison, I take the corresponding figures for the Glasgow Western Infirmary during the same decennium, there was a total of 300 amputations with 51 deaths; 17 per cent.

Allowing for variations, due to differences in type of industrial accidents, these figures may be regarded as practically identical; the death rate being therefore a little above or a little below 20 per cent, as compared with the death rate for the decennium fifty years before, of almost 43 per cent. It is even more instructive to compare the figures for amputations of the thigh in the two decennial periods in the Royal Infirmary. In the earlier period, there were forty-three deaths out of

seventy-two cases of amputation of the thigh; in the more recent period, only one death is recorded out of thirty-six cases.*

Taking the larger figures, however, by themselves, the fact is established that the mortality rate in cases of major amputations, in the same Infirmary, had been reduced from 43 per cent to 20 per cent in the space of half a century. The contrast is striking enough even as it stands, but the great drop in the mortality rate, stated thus baldly, is not even the end of the story. The figures become more striking when one has regard to two further considerations.

ANTISEPSIS OFTEN REMOVES NECESSITY FOR AMPUTATION

The first of these considerations depends on the fact that, in the pre-Listerian days, amputation was performed almost as a matter of course in any case of grave, or even substantial injury to a limb, and particularly in compound fractures. The chief point of controversy, in those days, appears to have been regarding the stage at which amputation should be carried out, whether early or late. It seems to have been an accepted doctrine that any attempt to save a limb which was at all seriously damaged implied too great a hazard. Suppuration, gangrene, erysipelas, pyæmia, secondary hæmorrhage, tetanus; one or several of these were likely to develop, and with the usual disastrous sequel. Today, amputations instead of forming the great bulk of surgical practice in any of the large general hospitals, as they did in the old days, have come to be almost a rarity, especially in industrial accidents, or in injuries incident to the social conditions of the times. Such cases as now come to amputation are either due to disease, or to those accidental injuries in which the damage to the tissues is so extensive and severe that not merely is the vitality of the limb practically destroyed, but the life of the patient is seriously imperilled. The mortality rate, therefore, of 20 per cent, of the recent period represents an immeasurably better state of things than the simple figures suggest. The rate is calculated on the basis of a group of cases, which include only those of the worst, most severe, and least promising type. To get a proper conception, indeed, of the real advance that the half century has brought about, it would be necessary to take into consideration also the vast number of limbs saved, in which, in the earlier period, amputation would most certainly have been carried out. Amputation has come to be regarded, to-day, as a last resort, almost as a confession of surgical defeat or failure. Thanks to Lister, the great surgical ideal of to-day is not the successful amputation of a damaged limb, but its conservation. That great ideal of conservative surgery owes more to Lister, and to the Listerian doctrine, than to any one or to any thing else.

* Probably some allowance should be made here for a certain number of amputations of the thigh which may have been included in error in the list of amputations of the leg.

ANTISEPSIS PERMITS A GREAT EXTENSION OF THE FIELD OF SURGERY

The second consideration depends on the enormously widened field opened out by the success of antiseptic doctrine and practice. With the terrors of surgical infection banished, surgery has been extended with safety into domains that previously were effectually shut off from exploitation by even the most expert and the most daring surgical pioneer, and the operator of to-day is able to ply his art on a scale that would have appeared, and indeed would have been, hazardous in the extreme under the old conditions. Reference has been made earlier in this address to the record of eighty operations, quoted from the *Annual Report of the Royal Infirmary*, for the year 1827. Of these eighty, twenty were amputations. I take, for the purpose of comparison, the *Annual Report* of the same Infirmary for the year 1925, practically a century later, from which it appears that the operations for the year 1925 numbered 10,853, and of these only sixty-two were amputations. In other words, within the space of a hundred years, the annual operation total had been multiplied 135 times, while the number of amputations had been merely trebled. This expresses very well both the stupendous expansion of the domain of operative surgery, and the great development of the conservative ideal.

It has been said that, "statistics can be made to prove anything," and it may be admitted that there is a germ of truth in the generalization. But, if figures are carefully chosen, and employed with honesty of purpose, they are not necessarily the unreliable things that such a statement seems to imply. They may have a real value. I am well content to leave the figures I have quoted to tell their own tale, and to be interpreted according to the conviction of any honest enquirer.

GLASGOW ROYAL INFIRMARY THE FIRST HOSPITAL IN WHICH THE
VALUE OF ANTISEPSIS WAS PROVED

Glasgow is proud to think that the great re-birth of surgery took place within the walls of its oldest hospital, and the University of Glasgow cherishes the memory of her great Regius Professor of Surgery, and this in spite of the suggestion that has been made frequently enough, especially within recent years, that Glasgow has not had due regard to the memory of the Master. It is true that, in the earlier years after Lister began to promulgate his new theories, and to put them to practical test, he met with apathy, and even hostility, in Glasgow, as well as in Edinburgh, and in London. I believe, however, that it could be successfully maintained that the opposition which he encountered in these earlier years was less formidable in Glasgow than elsewhere. But, after all, controversy on such a question leads one nowhere, and serves no good end.

DEVELOPMENT OF OPPOSITION TO LISTER'S METHODS

It is, indeed, a fact that the promulgator of any new doctrine is generally received coldly. The revolutionary is always suspect. He is liable to be misjudged, maligned, opposed, and even at times painfully misrepresented. His teaching is generally called in question, and even held up to derision. Often enough his purposes, and his motives, are subjected to insinuation, or to innuendo, by the exponents and defenders of the older school of teaching, whose dominance seems to be challenged by the new teaching. It is ever the same. Old ideas die hard. Old doctrines are not easily assailed, and are with difficulty overturned. The traditional fate of the revolutionary is a hard one.

This traditional fate Lister did not escape. From the lot of the revolutionary he was not spared. In the art and practice of surgery, and in the teaching of its principles, Lister was a great revolutionary. He was bound to meet with opposition, and he did. He was apt to be misrepresented, and he most certainly was; indeed, the misrepresentation was often unscrupulous, and it came, frequently, from those who stood to benefit most from the great boon he had to offer. This same fate had been the lot of Semmelweiss in his efforts to banish the scourge of puerperal fever from the practice of obstetrics. It would have been strange, indeed, had Lister escaped the common fate.

It may seem to us, who live in the light that has flowed from his work and teaching, almost impossible to understand how Lister's opponents, with the abounding evidence before them of the success of the new system, could have denied to him, for so long, the verdict that experience has now so fully accorded. It has been said by someone that "Lister's opponents asked for statistics," but that "Lister was too busy studying and experimenting to trouble with statistics." Yet, the statistics were there to their hand. It all depended on how they were to be applied, how they were to be interpreted.

Lister, however, was not dismayed, though he might be grieved by the opposition which he encountered. The older surgeons might spurn his doctrine, and minimize or misconstrue his results. They might speak scornfully of his investigations, and of the application of these to surgical practice. He was confident of the soundness of his conclusions, and of the correctness of his deductions. One cannot read the story of his researches, of their regular, ordered, systematized sequence; of how he made one step after another, making sure of each foothold ere ever he stepped a little higher and a little onward, without feeling that there never took place a more carefully controlled, a more truly scientific sequence of progressive investigation and research in the whole history of medicine or surgery.

And Lister was always his own most severe critic. A piece of reasoning, if it had successfully passed the bar of his own scrupulous and searching criticism, was hardly open any longer to effective attack.

As I have said, on another occasion, of his disciple, MacEwen,¹⁴ so would I say of Lister in this connection "His research was thorough, his observations were thorough, and his deductions were not hurriedly made. Nothing was to him a fact till he had himself observed and proved it. One may say that, having dealt with every side of the subject, and applied all possible tests, he was able to come to a conclusion which was to him final." Not till he had done this did he feel justified in the general promulgation of any part of his doctrine; but once he had done so, it was to him unassailable. Time has told already how well grounded was the whole doctrine, and we know to-day to what an extent it has brought relief from suffering, saved life, and promoted the happiness and the health of the human race.

LISTER HAD THE ENTHUSIASTIC SUPPORT OF ASSISTANTS,
DRESSERS AND STUDENTS

Though Lister met with much opposition in Glasgow, in Edinburgh, and even more markedly in London, after his appointment to the Professorship at King's College; and though he encountered, in all three places, the chilling effects of apathy and indifference, yet, in the two former places, at least, he was supported with almost unanimous enthusiasm by large classes of students, and he was served by loyal dressers and assistants. His experience in this respect is just what might be expected. It is historically true to say that revolutionary doctrine receives generally its chief support from the younger men; from those who are not bound by tradition or by dogma, as are the older. And it is worthy of mention that, though Glasgow has been blamed sometimes for failing in regard for the memory of the Master, yet it was in Glasgow that, from the very first, Lister found some of his most loyal supporters. Sir Hector Cameron, "the beloved disciple," who believed in Lister and in his message with his whole heart, and throughout his active life proved his loyalty by the constant exposition and advocacy of the Listerian doctrine, is still with us. The late Sir William MacEwen, a student of Lister also took a large part in commending to his fellows the teachings of the Master, and gave a large place, in his lectures, to the exposition of the Listerian doctrine of wound infection and its prevention. MacEwen was one of the doughtiest fighters in the Listerian ranks.

Last year, in my oration on MacEwen,¹⁵ I took occasion to point out how great a part MacEwen took in commending to his fellows the precepts of Lister. MacEwen was a tower of strength to the cause. All through his life he preserved his admiration, and indeed his reverence, for Lister. No doubt MacEwen travelled farther than the Master. "At an earlier period, probably, than any other surgeon in this country, perhaps even in any country, he passed on to the development of what seemed to him the natural outcome of Lister's doctrine, namely, the ideal of asepsis, and of aseptic surgery." In the same oration, I told

how the late Sir William T. Gairdner, on one occasion, characterized the position of MacEwen and those who followed him, by using a parody of a well-known phrase and altering it thus: *Ipso Listero Listeriores*. Like Lister, MacEwen had to meet much opposition in his efforts to develop further the teaching of Lister. Even I am old enough to remember how MacEwen and his staff were held up to a good deal of ridicule in their earlier endeavours to develop their aseptic technique. Time, however, broke down prejudice, and everyone fell gradually into line with the inevitable advance.

Yes, Lister was well served by those who were his students, or his assistants. Throughout his life he frequently acknowledged this, and to none did he feel himself more beholden than to his students. On more than one occasion he made public reference to the debt he owed them. There is the occasion, mentioned by Godlee in his "Life,"¹⁶ when Lister, in 1902, having just been awarded the Copley Medal of the Royal Society, concluded his speech of thanks by saying that "he had often thought, that, if he did deserve any credit, it was at the time when, perfectly convinced of the truth of his principle on which he acted, and persuaded also of the enormous importance to mankind of being able to carry out that principle in practice, he worked for years together with exceedingly little encouragement from his professional brethren. There were, however, two great exceptions: his father-in-law, and his students."

STUDENTS UNANIMOUSLY SUPPORT HIS APPOINTMENT AS SURGEON TO THE INFIRMARY

The students of Glasgow to-day recall, with particular satisfaction, a somewhat striking incident, in which their predecessors of over sixty years ago took part. It illustrates well the closeness of the bond of sympathy which, from the first existed between Lister and his students, and it also serves to show how, with the almost prophetic vision of youth, Lister's earliest students foresaw the great future before his teaching, and its importance in the promotion of surgical advance.

When Lister came to Glasgow, on appointment to the Regius Chair of Surgery, in 1860, he found himself without any direct hospital connection. There was not then, as there is now, any obligation on the part of the hospital managers to provide the Regius Professor with the clinical material and facilities for his teaching and to assign him wards in the infirmary, where he might at the same time practise his art, and illustrate its principles clinically. No right of appointment to the charge of wards was then implied in the terms of his selection by the Crown for the Professorship in the University. Did he wish, as he was surely bound to do, to obtain these facilities, it was incumbent on him to await the occurrence of a casual vacancy on the staff of the Infirmary, and even then, to take his chance of election in competition with such other applic-

ants as might offer themselves. His chances of election to such fortuitous vacancy were no better—perhaps, in virtue of adverse local influences, rather worse—than those of any other candidate. In fact, Lister was unsuccessful at his first attempt, in 1860, the year of his arrival in Glasgow. The following year, however, another vacancy occurred, and fortune was this time with him. He was appointed to the charge of wards in the Royal Infirmary in the latter part of the year 1861. The way was now clear for the carrying out of the great work, which was to make the Lister wards, the Royal Infirmary, and the Regius Chair of Surgery in the University of Glasgow, world-famous.

This explanation is necessary to a due appreciation of the incident which Glasgow students remember with much satisfaction and interest. Lister, in his first session after appointment to the Chair, lectured to a class of 182 students, and, at the close of the session, the members of the class took the altogether unusual course of presenting him with an address, expressing their appreciation of the lectures he had delivered to them, and the very high estimate they had formed of him as a teacher of surgery. But they did not stop with this general expression of their appreciation. There was a prospective vacancy on the staff of the Royal Infirmary, and Lister was a candidate for the appointment. The students, therefore, proceeded to express their hope that, “for the sake both of the rising profession, and of the Institution itself,” his application would be successful. In other words, the address was meant to be what we would regard, today, as a testimonial in support of his application. It was signed by 161 members of his class.

The incident seems to have been of so unusual a character as to justify this special reference. It was what one may call a reversal of the usual. The teacher of to-day is accustomed to give testimonials to such of his students as may seem to merit them, to further their career, and to support their claims to such appointments as their abilities warrant, and the stage of their professional development may justify. Here we have the very opposite, the reversed process; the students giving testimony to their loved teacher, in whose ability and future they saw, with confidence, great things.

The address is worthy of being quoted in full:—

“Joseph Lister, Esquire, F.R.S.,

Professor of Surgery in the University of Glasgow.

Sir,

We the undersigned students of Surgery in the University of Glasgow cannot allow this, the first, session of your Professorship to close without thus formally expressing our high opinion of the lectures which you have delivered, and recording our testimony to your eminent ability as a teacher of Surgery.

Permit us also to express our hope, for the sake both of the rising Profession, and of the Institution itself, that in the approaching appointment of a Surgeon to the Royal Infirmary, your application may meet with that success which your ability and position demand.”

The address is still preserved. It forms one of the exhibits—I venture to think, one of the most interesting—in this great collection.

The signatures of almost all who subscribed it to are capable still of being recognized without much difficulty, in spite of the inevitable ravages of dust and age. I came upon it, some months ago, by accident, in the course of a somewhat casual survey of some of the exhibits, and my interest was stimulated by the accidental discovery amongst the signatures of an uncle of my wife, and of an uncle of my own. I had not previously realised that they had been members of Lister's first class in Glasgow, though I knew that they had been his students. Both are now dead, but their signatures are there, clearly recognizable—"William Loch Stuart," and "John Young"—and I like to think that, through them, I have a link with our great Master other than that of my official bond of union as the humble occupant, for the time, of the Chair which he adorned. I have been able since to trace and to obtain the class tickets and the diplomas of both. These have the signature of Joseph Lister. They are cherished possessions.

I am glad to think that the original document of the address, the property of the Glasgow Lister Memorial Committee, with its almost prophetic foreshadowing of the great future for Lister and his work, will come to rest finally where it was presented so long ago.

LISTER'S APPRECIATION OF HIS STUDENTS' SUPPORT

It is certain that Lister never forgot the support and appreciation of his students, in Glasgow and in Edinburgh, and one of the later of his public addresses was that which he delivered before the Glasgow University Medico-Chirurgical Society, in May, 1894. The engagement was a long promised one, and one not to be soon forgotten by any of those who were privileged to be present. The Hall of the Students' Union was crowded, as well it might be. There was a great assembly of students; members of the Society, and many former assistants and house surgeons, and a few old colleagues. Lister's theme had reference to the great subject, the working out of which had constituted the main object of his active surgical life. He dealt mainly with the simplification of antiseptic technique. The address was received with great interest and enthusiasm, but it was probably the presence of the Master, more than the subject matter, or the manner of delivery of the address which marked the meeting, in the minds of those who were privileged to be there, as a memorable event. MacEwen, who was called upon to speak, after Lister had finished, indicated his sense of this dominant feature of the meeting by uttering a single sentence, and at once resuming his seat. The sentence was this:—"When the nightingale sings, all the other birds are silent, lest their feeble notes disturb its song."

This was the only occasion on which I saw Lister, and the occasion was made especially memorable to me by the fact that, being an official of the Society, I had the very great honour of shaking hands with him.

I have finished what I set out to do, namely, to offer, on my own

behalf, and on behalf of the great School of Surgery where Lister's life-work was begun and in great measure brought to fruition, a tribute of admiration, respect, and of veneration to his great memory.

Glasgow has not forgotten Lister, nor will the University of Glasgow soon forget her great Regius Professor. It is surely a great thing for the alumni of Glasgow to be able to feel that, through the work of Lister, it may be said truly of the surgeon of to-day, all the world over "His lines are fallen unto him in pleasant places; yea, he has a goodly heritage."¹⁷

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THE CENTENNIAL CELEBRATION OF LISTER'S BIRTH

By

THE BRITISH MEDICAL ASSOCIATION AT ITS ANNUAL
MEETING, EDINBURGH, JULY 20, 1927

Reported by Dr. George Herbert Rae Gibson, D.S.O.

O celebrate the Centenary of the birth of this the greatest of all surgeons a distinguished company was gathered together in the McEwan Hall, Edinburgh, on the evening of Wednesday July 20, 1927. The Earl of Balfour, Chancellor of the University, presided, and was supported by Lord Provost Stevenson, Sir Alfred Ewing, Principal of the University; Sir Robert Philip, President of the British Medical Association, Sheriff Crole, Dr. G. M. Robertson, President of the Royal College of Physicians, and Dr. Logan Turner, President of the Royal College of Surgeons. Among the platform party were many old students of the time of Lister: Sir George Beatson, Sir George Berry, Sir Montague Cotterill, Dr. C. W. Macgillivray, Dr. T. M. Ronaldson, Sir William Watson Cheyne, Professor Tuffier of Paris, Professor Harvey Cushing of Boston, Professor John Stewart of Halifax, as well as Professor Wilkie and Professor John Fraser the present professors of surgery and clinical surgery. Among overseas representatives were Professor H. S. Birkett, C.M.G., Montreal, and Dr. John Fotheringham, C.M.G., Toronto. Those who that afternoon had received the honorary degree of Doctor of Laws of Edinburgh University were also present, and included the following: Vittorio Ascoli (Rome); Professor Charles L. Dana, (New York); the Right Hon. Lord Dawson of Penn, Professor Knud Faber, (Copenhagen), Professor Jan van der Hoeve, (Leyden), Professor Otto Meyerhof, (Berlin), Sir Berkeley Moynihan, Sir John Herbert Parsons, Sir Humphry Rolleston, Professor George Frederic Still, Professor Thayer, (Baltimore), Sir Almroth Wright.

The Earl of Balfour in paying his tribute to the memory of Lord Lister, linked his name with those of Pasteur and Simpson. He referred to the fact that surgery without aseptic treatment was too often the harbinger of death rather than the cause of health and recovery. Lister had made possible those operations that the discovery of the anæsthetic properties of chloroform had made feasible, but which the conditions in the hospitals had up to Lister's day rendered so disastrous. He spoke of the old days, the terrible page in the history of medicine, where, to

read what went on made one's blood almost run cold. It was a situation horrible to the surgeons, horrible though fortunately not always known to the patients, and it made one feel that of all the benefactors of sick and suffering mankind, the greatest benefactor was Lister himself.

Sir William Watson Cheyne spoke of these pre-Listerian days, when it had been far from a pleasure to go into a surgical ward. Most of the patients were suffering pain, many were delirious. To-day, patients are happy and contented, with seldom any complaint of suffering. Operations which would never have been performed in former days on account of the danger to life were now everyday occurrences. This had been brought about by the work of two men—Lister and Pasteur. Lister's influence on the students was very great indeed. It was of interest to record the fact that at the end of the first year's work in Glasgow his class sent him a letter of thanks for his interesting lectures and hoped that he would soon be appointed to the staff of the Infirmary.

Professor Tuffier of Paris recalled the scene of the meeting of Lister and Pasteur in the huge amphitheatre of the Sorbonne at the celebration of Pasteur's jubilee in Paris. An immense gathering was present composed of the leaders of science, who had come from all quarters of the globe. Never before had there been such a wonderful concourse of eminent men in that great amphitheatre. During the Great War the clinical and biological discoveries of Carrell and Dakin, true disciples of Listerian principles, brought about by their improved methods the disinfection of wounds, thus lowering mortality and saving thousands of lives.

Professor Harvey Cushing compared Lister and Lincoln. A short time ago, on a May morning he had been standing at the Lincoln Memorial in Washington, and as he read again the phrases of the speech at Gettysburg, it occurred to him that the words might be applied to the work of Lister. It was idle to speculate whether opportunity more often made the man—as was perhaps true of Lincoln—or the man his opportunity as was apparently the case with Lister. The really important thing was that the conjunction should take place. The opportunity to do something of lasting benefit to one's fellow men doubtless lay before all of us, yet even if we had the imagination to realize it, we lacked the courage to grapple with it, the tenacity to hold it, the perseverance and unselfishness to secure converts and disciples.

The last speaker was Professor John Stewart who had come far to pay his tribute to the memory of his old chief and teacher. He struck a simple, human and personal note, which carried conviction to his hearers. Simplicity was the keynote of Lister's life and teaching. He was simple in his faith, simple in his methods and simple in his thoughts and desires, but intensely earnest in his work. He had a love for music, a love for Scottish song, a love for children and a keen sense of humour. Lister's devotion to his work and his earnestness in teaching, gave him a pre-occupied and serious air; but what some thought to be a certain

aloofness in Lister was really the shyness of a child. The foundation of Lister's character was his Christian faith. In recalling memories of Lister, in reading and re-reading his letters, what impressed him most was his confidence in the continuity of life, in personal immortality. The first time he heard Lister express an opinion on this subject was at a dinner party when the conversation turned on recent speculations as to a future life. Lister said: "If I could believe that there was no life beyond this, I should have indeed little heart for any work." In the graduation address of 1876, Lister used these words, "It is our proud office to tend the fleshly tabernacle of the immortal spirit." Life, human life, in its most helpless and most hopeless and most suffering phases, was the medium in which he worked. He never believed that death ended all, or that the weak and battered tabernacle had no tenant. One of his most precious possessions was the letter Lister wrote to him on the death of Lady Lister, in which the words occurred: "May you and I so live during the rest of our time on earth that we may rejoin her;" in another letter he wrote: "It is indeed a grand thing to have hope in a future, which will surpass in its capacities, its glories, and its beauties all the good we have ever known here."

The occasion was also appropriately recognized by an exhibition of Lister relics in the Upper Library Hall of the Old University Buildings. This was largely attended by the members of the British Medical Association, whose annual meeting coincided with the Lister Centenary celebrations, and by members of the general public, and formed a very distinctive feature of the celebration. His portrait by Mr. J. H. Lorimer, R.A., his diplomas and gold medals, and the caskets containing the scrolls of the freedom of three great cities, Edinburgh, Glasgow and London were all displayed. There were also reminders of the pre-antiseptic days in a model of the old Lister ward in the Glasgow Royal Infirmary, and the old fashioned hospital chairs, tables, and instruments.

The event was further marked by the publication by the Lister Committee of a Lister Memorial Volume. This handsome publication, edited by Dr. Logan Turner is full of interest. It contains a biographical sketch of Lord Lister by Sir George Beatson. Mr. Alexander Miles has written "Before the Dawn" a description of the days of darkness before Lister came. There are also articles on "Lister as a Physiologist" and "The Influence of Lister's Work on Surgery" by Sir Edward Sharpey-Schäfer and Professor John Fraser. A very interesting feature of the production is the collection of 'Reminiscences' by former clerks, dressers and house-surgeons of Lord Lister. The volume is well illustrated by a number of etchings and photographs of Lord Lister, the houses where he lived and the hospitals in which he worked.

A tablet with a simple inscription has been placed upon the two houses occupied by Lister during his residence in Edinburgh.

LISTER'S FIRST VISIT TO AMERICA*

AT the International Medical Congress held in the city of Philadelphia in 1876, Joseph Lister, F.R.S., of Edinburgh was president of the Section on Surgery. On taking the chair, Professor Lister said:—

Gentlemen: Although I am well aware that the time of this section is exceedingly precious, I cannot refrain from expressing my deep sense of the honour I have received, an honour as great as it was entirely unexpected, in being called upon to preside over the Surgical Department of this great International Congress, sitting as it does in the chief centre of medical instruction on this vast continent. American surgeons are renowned throughout the world for their inventive genius, and boldness and skill in execution. It is to America that we owe anæsthesia, the greatest boon conferred upon suffering humanity by human means; from America came the ligature of the common iliac artery for aneurism; the ligature of the internal iliac for the same disease; the "extension treatment" by the weight and pulley for fractures of the thigh, and other injuries and diseases; the reduction of dislocation of the hip-joint by manipulation; and that model of ingenuity, which I cannot mention without alluding to the name of its inventor, Sayre's splint for morbus coxarius. These are but examples of what surgery owes to this country, and it might, therefore, well have been that some American surgeon should have been called upon to preside over this Section of the Congress. Yet I assure you, gentlemen, that highly as I esteem this honour, it is the more gratifying to me because I am persuaded that it has not been conferred on account of any special merit of my own, but in consequence of the interest felt by the profession in Antiseptic Surgery, with which my name happens to be connected. It was the circumstance of my observing in the programme of the business of the Congress, that the subject of antiseptic surgery was to come on first for discussion, that led me to cross the Atlantic; and I should be pleased, indeed, if the discussion which is about to take place should have the effect of strengthening the belief of the profession in the truth, the value, and the practical application of the principles of antiseptic surgery."

The first paper presented was one on Antiseptic Surgery, by John T. Hodgen, M.D., of St. Louis. A lengthy discussion followed in which, among many others, two Canadian surgeons took part.

Dr. J. A. Grant, of Ottawa, said: For many years we used cold-water dressings at the Ottawa Hospital, with great success, yet failed to

* Abstract from the Transactions of the International Medical Congress, Philadelphia, 1876.

obtain results equal to those secured by Prof. Lister. I, therefore, made a visit to Edinburgh, and was fully convinced of the superiority of the antiseptic method. I was particularly attracted by the extreme care and cleanliness which characterized all of Prof. Lister's operations.

Dr. William Canniff, of Toronto, Canada, said: It is, I believe, very generally acknowledged that the air is inhabited by various forms of germs—organisms possessing different degrees of vitality, but it remains a question whether putrefaction is due to the operation of these microscopic organisms. Dr. Hodgkin's first proposition states that "putrefaction may and does occur in the solids and liquids of the body, both with and without the direct contact of germs found in the air or water." Well, if that is the case, I submit that the doctrine urged by Prof. Lister is undermined.

Dr. Hodgkin said: I did not intend to convey the meaning that germs are not present in all cases of putrefaction. The organisms may be introduced to the part through the blood.

Dr. Canniff said: Then what is the use of applying to a wound or open abscess means to form a barrier to the ingress of germs? If organisms can enter the system through the lungs, or any other mucous surface, and find their way to a certain part to work mischief, it is entirely futile to adopt any procedure to prevent their action. I should like to ask the advocates of the germ theory if they hold that organic matter can never putrefy without the operation of air germs. Because if it ever does, it would be difficult in any given case of putrefaction to show that this was not a simple change in the elements composing the dead animal matter. My own experience is such that I find it impossible to entertain the doctrine of germ putrefaction. I may say that the practice recommended by Prof. Lister has not been adopted in the Toronto Hospital; his doctrine is not as yet acted upon; and I feel safe in saying that the success attending the treatment of wounds in that Institution is not exceeded by that in any other.

In speaking of the treatment pursued in the Toronto Hospital I do not intend to convey the impression that the agents called antiseptics are not used. They are constantly employed for purifying tissue, not with the view of destroying or preventing the action of air germs, but to arrest or prevent putrefying decomposition due to chemical changes. In conclusion, I would say that I believe that everything, almost, depends upon cleanliness in the management of wounds; and I believe that the success which has been obtained by those who practice according to Prof. Lister's theory, is greatly due to the cleanliness which that practice secures. Next to cleanliness, I think that the maintenance of rest is valuable; physical and physiological rest. Rest after the evacuation of an abscess will often secure an early adhesion of the walls of the collapsed sac. Pressure again is an important element in the treatment of wounds so as to press away fluid in the part, and to prevent feeble

circulation or stagnation of blood in the tissues which have to supply the reparative material. And lastly, attention must be given to the constitution and to the surroundings of the patient. Is it not to be feared that the particular treatment advised by Prof. Lister tends to divert the attention of the surgeon from these essential points?